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DeLorean Club of Oregon
News & Information

Apr. 21, 1998

Start of Another Year

by Knut Grimsrud

We kicked off another year with dinner at Stuart Anderson's Cattle Company in Beaverton. The first thing I learned from our newest member at the dinner was that new members who may not have attended previous events have no idea what many of us look like, nor would know us from the queen of England. Starting with this issue, I will include a member profile with each issue so we might better recognize our fellow DeLorean enthusiasts in the future.

Without Russ in attendance, no one in the party was mistaken for John Z. this year, and we received no free appetizers. We did enjoy the company of a couple established members and a newcomer. We spent most of the evening sharing horror stories and troubleshooting tips with a new car owner and our newest member. Although he assured us that he was already feeling under the weather before dinner, I wonder if maybe our stories contributed to his ill feeling. Our warmest welcome to our newest member owners and enthusiasts.

When not sharing war stories and troubleshooting ideas, some ideas for club events and procedures were covered. Ideas centered on ways to spur participation by varying the nature of the events to better cover the interests of a broader cross section of members. In addition to the BBQ and troubleshooting event which usually receives good attendance, and the larger auto related events in the community like the All British Field Meet, we will be adding events like a club golf outing and participation in the IPD Volvo parts discount bazaar at their garage sale. Suggestions for other events or interests is always welcome and assistance in making suitable arrangements and preparations is appreciated. See the events calendar at the end of this issue for our preliminary events schedule for the year. Some of the events will be refined over the next few weeks as the details are worked out.

Another day in the limelight

A-Post Trim Deterioration

by Knut Grimsrud

One common problem I have seen with many DeLoreans, especially those from warm climates, is a deformation of the A-post trim (the A-posts are the portion of the frame on either side of the windshield which supports the windshield and roof structure – item number 34 in the diagram). The vinyl trim seems to deform and bulge next to the windshield over time as it is exposed to heat.

Having gotten rather tired of the ugly appearance of my trim (mine was deformed so badly that the vinyl had separated at the windshield leaving a big pocket clearly visible from the front of the car), I finally decided to look into the problem and possible solutions. I was pleased to find that restoring the trim is not particularly challenging (although I didn't spend the time to make mine "pristine" it looks infinitely better than before).

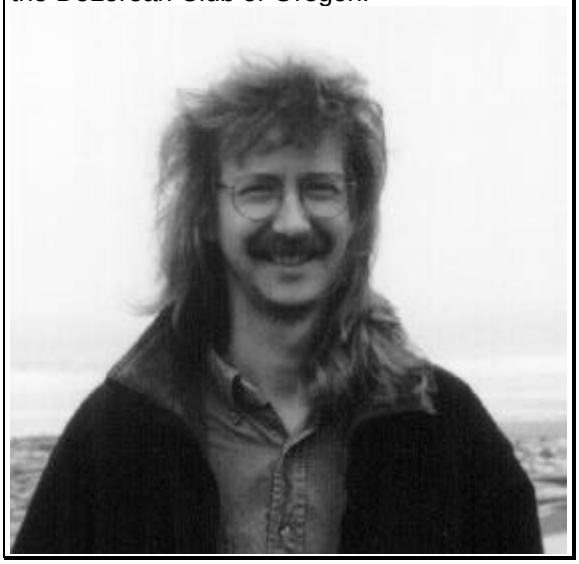
I found that the A-post trim consists of a black plastic liner made of a material similar to PVC over which the vinyl is sheathed. The deformation of the trim is due to the black plastic material getting warm enough in the summer sun to become soft and deform. The plastic liner becomes soft at a surprisingly low temperature and is easily pliable once warmed and is fairly easily worked.

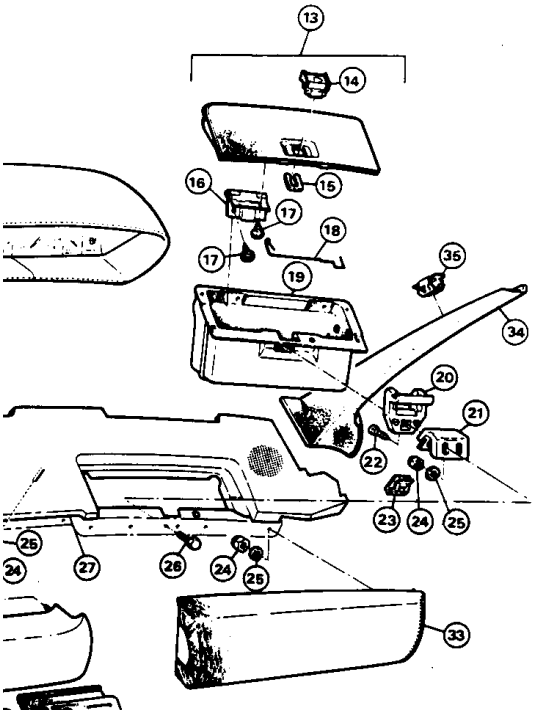
Correcting much of the deformation in my A-post trim was relatively straightforward. Start by removing the trim piece. The piece is removed by releasing the vinyl from around the edges (in my case the plastic liner was not glued to the A-post itself, it was only held in place by the vinyl being attached around the perimeter). Start by pulling back the inner rubber door seal from the bottom of the A-post (near the front door catch) to the top of the A-post. There is no need to pull the entire seal off, only pull it off for the stretch up the A-post. Once the seal is pulled back, the vinyl from the A-post trim should be clearly visible as it is folded over the edge of the lip to which the door seal attaches. In order to easily remove the trim piece, I used a heat gun (essentially a hair dryer on steroids) to warm up the vinyl along the lip until the vinyl was soft and pliable and the adhesive adequately weakened. At this point, the vinyl simply peels off the lip without damage to either.

Member Profile: Knut Grimsrud

Knut Grimsrud, a native of Norway, purchased his DeLorean in 1993 and has been an avid DeLorean enthusiast since. Not realizing the DMC-12 was anything more than a movie prop, he purchased the first DMC he saw on an impulse. As coordinator for the DeLorean Club of Oregon, he shares his enthusiasm for the car and its history with anyone willing to listen. His patient wife Melinda not only humors his interest in the car and the time he spends promoting and tinkering with it, but even tolerates the DeLorean photos in the honeymoon album.

Having earned his Ph.D. in electrical and computer engineering, Knut currently works at Intel where he spends his time in research and development. When he is not tinkering with his DeLorean or researching it's various facets, Knut spends his time coordinating the construction of his dream home on 10 acres outside Portland. He can be reached via e-mail at knut.s.grimsrud@intel.com or through the DeLorean Club of Oregon.





In my case, the end of the vinyl tucked between the windshield and the A-post had already come loose, so no further work was necessary to get the trim piece loose. If this is not the case, I'm sure that a little heat to made the adhesives pliable would be sufficient to pull the vinyl out from between the windshield and the A-post.

The trim panel fits slightly underneath the interior T section of the headliner at the top of the A-post, however I found there was sufficient give in both the trim piece and the headliner to free it without requiring the removal of the interior headliner section. In my case there was a black sticky substance along the lip where the rubber door seals were, and care had to be taken to avoid tracking this goo onto the headliner material – take care to keep your hands clean when working with interior stuff.

Once the trim piece is removed, it can be readily worked. Upon inspection, it appeared to me that the piece was made from a sheet of black PVC that had been heated and shaped into the final form. Using my heat gun, I warmed up the inside of a small section of the trim piece until it became slightly soft (don't melt the plastic, only soften it). In order to adequately heat the plastic, it must be heated from the inside, since the vinyl sheathing effectively insulates the plastic making it difficult to adequately warm the plastic without risking scorching the vinyl. I'm uncertain whether an adequate temperature can be reached with a hair dryer to soften the plastic – a heat gun is likely the appropriate tool for the task.

Once the plastic is slightly softened in a section, it can be shaped and allowed to cool before moving on to the next section. In order to shape the plastic liner, I used a small block of wood with a smooth flat side. After the plastic was warmed, I placed the block on the inside of the liner and pressed the plastic against it from the vinyl-covered outside in order to eliminate the bulging deformations. Warming a small section about the size of the block of wood at each step worked quite nicely.

Once the plastic liner of the trim piece has been re-shaped, install it by reversing the removal procedure. I again slightly warmed the vinyl to make it pliable before pulling it over the outer lip where the weather strip goes and held it in place over the lip while the vinyl cooled by simply seating the weather strip over the lip. In order to tuck the vinyl back between the A-post and the windshield, I found a spackling knife and a bit of patience to be particularly helpful. Care should be taken to avoid stressing and possibly cracking the windshield by applying too much force in tucking in the vinyl.

In warm southern climates, a more permanent solution might be to create a fiberglass inner liner to replace the soft plastic liner by using the plastic liner essentially as a mold. I have yet to try this, but it might be something you can explore if you have a persistent problem with the A-post trim deforming.

Tech Notes

With this issue I start a series on the Bosch K-Jetronic mixture control system and a simple electronic circuit that can be built to monitor the operation of the control system and the resulting air/fuel ratio. The data presented here on the fuel injection system is primarily taken from the book *Automotive Electric/Electronic Systems* published by Bosch, which is an excellent reference on the operation on many of the Bosch systems in the DeLorean, as well as my own measurements and experimentation.

Bosch K-Jetronic Mixture Control

by Knut Grimsrud

In an effort to satiate my curiosity, I have spent a little time looking into the electronic mixture control system used in the DeLorean. Although conceptually simple, the details of the mixture control proved to make interesting research. In this and the next few issues, I will concentrate on the computerized mixture control system only, and will not include information on the other fuel enrichment systems that come into play during cold start and engine warmup or the fuel dosing that the fuel distributor does in response to the air input deflection plate in the intake.

The computerized mixture control system consists of several interacting components that all work together to continuously control the amount of fuel injected. The system generally consists of a fuel dosing mechanism, a mixture monitoring system, and a computer to control the dosing mechanism based on the monitored mixture.

Aside from the operation of the fuel distributor in response to the air input deflection plate, the fuel dosing mechanism is primarily driven by the operation of the frequency valve. The frequency valve is the item in the engine compartment that buzzes at a frequency of about 70 Hz and is often confused with a range of engine anomalies. The valve opens and closes about 70 times per second, and to adjust the fuel flow rate the duration which the valve is open versus closed is controlled. This ratio of open to closed time is sometimes referred to as the duty cycle or the dwell of the frequency valve.

By controlling the flow through the frequency valve, the fuel system pressure to the lower chamber of the fuel distributor is controlled. As the valve is opened, fuel is allowed to flow back to the tank and the pressure to the fuel distributor lower chamber is decreased which results in an increase in the amount of fuel injected and an enriched mixture. As the valve is closed the amount of fuel dumped back into the fuel tank is decreased and the pressure to the lower chamber of the injection distributor is increased resulting in less fuel being injected and a leaner mixture. As the duty cycle of the frequency valve is varied the amount of fuel injected and thus the mixture is controlled.

DeLorean Performance Parts

In my search for performance components for my spare engine rebuild project, I happened upon a local source for original and performance Volvo replacement components. IPD is a national Volvo components distribution outfit that happens to be located right here in Portland. They are having their 15th Annual Garage Sale on May 16 from 9:00am to 1:00pm at their warehouse by the PDX airport and will feature a discount on Volvo parts (these guys will know exactly what you mean by a B28F engine and may have interesting performance components for it) door prizes, as well as seminars and activities.

IPD can be reached at www.ipdusa.com or at (503) 257-7500 or (800) 444-6473. The IPD site can be found on Airport Way eastbound from I-205. Turn right just past Marriott Courtyard (directly across from Shilo Inn entrance). This puts you on Ainsworth Circle where IPD is the third building on the right. Parking will be across the street, to the left.

Message from your Coordinator

Based on the activity in various regional and national DeLorean interest groups, it would appear that there is a resurgence in the activity of these interest groups. The DeLorean Mailing List has 1000 subscribers, an enthusiast puts on a national DeLorean event at his own initiative in Cincinnati that has already booked one hotel and is spilling into the next, and regional clubs are gearing up for an active summer season.

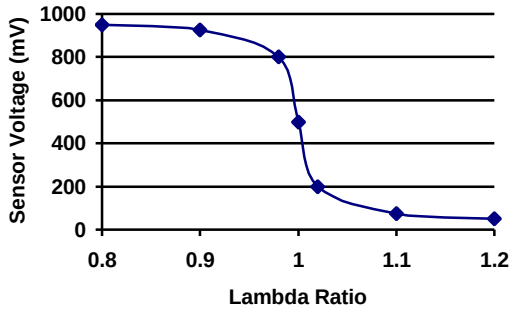
Although I reported in the last issue that DMC-12 prices have been decreasing steadily, this should not be interpreted as an indication that interest in the cars is also decreasing. Based on the number of recent contacts I have had from new or aspiring owners, my assertion is that DeLoreans are changing hands and interest in them is on the increase (maybe the cars are changing hands because the prices have been dropping steadily?).

As new car owners face the rewards and challenges of car ownership, regional and national support groups such as the various DeLorean car clubs, increasingly become a focal point for the exchange of ideas and information. This club, as most others, seeks to provide the services and information that DeLorean owners find helpful. To maximize the value of your club, please consider contribution some tips and information to share with your fellow DeLorean owners and enthusiasts.

The mixture monitoring system consists of an exhaust gas sensor, usually referred to as the *lambda* sensor, that measures the oxygen content of the exhaust gasses. Since the oxygen content of the exhaust gas varies with the air/fuel mixture, the sensor can be used to indirectly measure the mixture. As the mixture leans out, the amount of oxygen present in the combustion chamber is more than that required to burn all of the gasoline present and this excess oxygen is present in the exhaust gas. With a rich mixture there is insufficient oxygen present in the combustion mixture to burn all of the gasoline present and the exhaust gas will have a corresponding reduction in the amount of oxygen present.

In the literature, the fraction of oxygen present to complete the combustion of all the gasoline present is referred to as the *lambda* ratio. A lambda ratio less than 1 indicates that there is less oxygen present than that required to completely combust the gasoline present which corresponds to a rich mixture, while a lambda greater than one indicates there is excess oxygen present and a lean mixture. The lambda sensor takes its name from this nomenclature.

The lambda sensor generates a voltage according to the amount of oxygen present in the exhaust gasses and roughly has a voltage characteristic as illustrated in the figure. For a rich mixture (lambda less than 1.0) the voltage is high (up to around 1.0 volts), while for a lean mixture the voltage is low (about 0 volts). The voltage generated by the lambda sensor is a result of an electrolytic reaction between oxygen molecules in the exhaust gasses and platinum electrodes. The reaction only takes place at high temperatures (above about 350^{o}C) which is why the signal is ignored by the computer until a minimum engine temperature is reached. The reaction has the side-effect of consuming the lambda sensor which has a life of around 30,000 to 50,000 miles (this is why the lambda warning light in the cockpit comes on every 30,000 miles – to remind you that the lambda sensor needs to be replaced).



Because of the nature of the electro-chemical reaction that generates the lambda voltage, the sensor produces very little output current. Hence, when attempting to measure the output of the sensor, an instrument must be used that requires negligible signal current, or the signal will be lost as soon as the instrument is connected. Most high quality digital multi-meters have sufficiently high input impedances to directly measure the voltage from the lambda sensor.

From the voltage characteristic, notice that the voltage changes rapidly from high to low at a lambda of around 1.0. Thus, the sensor can be effectively used to gauge whether the mixture is too rich or lean simply by determining whether the voltage is high or low. This voltage is supplied to the ECU mixture control computer and is the basis for any mixture adjustment the computer does.

The final part of the circuit is the mixture control computer, commonly referred to as the ECU. In addition to the input signal from the lambda sensor, the ECU has several other inputs that it uses to determine the proper amount of fuel to inject. These other signals include the engine temperature (when the engine is cold the mixture is enriched slightly), the full throttle micro switch (when you floor the pedal the mixture is enriched a little to provide better engine performance), and the engine RPM. Using the lambda input signal, the computer determines whether the mixture is too lean or too rich, and based on that decision it adjusts the duty cycle of the frequency valve to counter the condition and to change the amount of fuel that is injected.

Conceptually the computer adjustment is quite simple, although in practice it is a little more complicated/interesting. The algorithm used by the control computer is such that the computer is never satisfied with the mixture and is always adjusting it one way or the other. This adjustment is continuous and fairly rapid (on my car the mixture swings between rich and lean about once a second) and generally results in the mixture oscillating between rich and lean.

When the voltage of the sensor exceeds the threshold from lean to rich, the computer decreases the amount of fuel injected by changing the duty cycle of the frequency valve. The computer continues to further decrease the amount of fuel injected until the lambda sensor voltage drops below the threshold from rich to lean at which time the amount of fuel injected is stepped up. The amount of fuel injected is further increased until the lambda sensor voltage crosses the threshold and the cycle starts all over again.

Based on measurements from my car, I have found that although the mixture control system works great in theory, in practice it leaves something to be desired. With my car, at least, the exhaust gas response to a change in the injection amount by the frequency valve is fairly slow such that when the ECU switches from an enrichment to a leaning mode (and visa versa), it has time to lean the mixture out too much before catching itself and then attempt to enrich it again. This “too lean” / “too rich” oscillation occurs about once to twice per second – rather than ensuring an ideal mixture, it is always “hunting” and pretty much ensures that the mixture is always messed up.

The ECU has a “limp-home mode” intended to ensure that the car still operates despite a failure of one of the sensors feeding the control computer. In limping mode, the computer stops attempting to control the mixture and instead sets the duty cycle of the frequency valve to a fixed pre-determined value (incidentally, when you floor the pedal, the ECU also stops adjusting the mixture and sets the duty cycle of the frequency valve to a fixed pre-determined value). Some experimentation with disconnecting the lambda sensor from the ECU (which puts it in limping mode) can be done to see how the mixture behaves without control from the ECU.

In the next issue I will outline a simple circuit that will allow you to readily monitor the signal from the lambda sensor and effectively watch the engine’s fuel mixture while driving your car.

DeCO Events Calendar

Sunday May 31, '98 Coastal Golf Trip to Gearhart

Enjoy a round at the scenic Gearhard Golf Course, supposedly the oldest golf course west of the Mississippi. Tee time will be around 11:00. Gearhart is a couple miles north of Seaside on the Oregon coast. Please RSVP by the 24th so we can secure appropriate tee times. If you're driving from Portland, join me for a hearty breakfast at Camp 18 enroute to Gearhart.

June 12-14, '98 National DeLorean Car Show

Cincinnati Museum of Natural History, Cincinnati, Ohio
Contact Ken Koncelik (513) 398-2445 or KKoncelik@aol.com or check out the web site accessible via www.dmcnews.com
The event includes a tour of the former Kapac warehouse as well as technical seminars from the experts. At last count the expected attendance was around 150. The registration deadline may already have passed, but contact Ken for details.

Sunday July 12, '98 Discontinued/Orphaned Car Show & Picnic

11:00am – 4:00pm Kelson's Mercantile, 15045 SE 256th St., Kent, WA 98042 (253) 630-3423. For information contact Kent Sullivan (425) 392-9167 kentsu@microsoft.com
This event will likely draw interesting cars from the entire Northwest and will surely include a DeLorean contingent from the Pacific Northwest DeLorean Club as well.

Saturday Aug. 15, '98 BBQ & Troubleshooting

BBQ and DMC troubleshooting

Labor Day, '98 All British Field Meet

Annual field meet Labor Day weekend Portland International Raceway. Car show on Saturday, swap meet and race on Sunday.

For Sale & Wanted

Advertisement of DeLorean related items is provided as a service to club members free of charge. Commercial advertisements available at negotiated rates and at my discretion.

For Sale

'81 DeLorean 5-speed w/ gray interior, 55K miles. Includes extra engine (heat damaged), extra driver's door with blemish, and manuals. $7850 for the complete package. Contact Jeff Home: (503) 625-3794, Work: (503) 625-6353.

For Sale

'81 DeLorean motivated seller buying house, price negotiable. Contact Dave Home: (360) 891-9104